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ABSTRACT

In order to explore the relationship between word recognition and comprehension, the oral reading behavior of two types of disabled readers--readers with poor comprehension but adequate word-recognition abilities (LoC-HiWR) and readers with good comprehension and poor word-recognition abilities (HiC-LoWR)--was compared. Subjects read orally two stories of high grade-three and grade-five readability and answered ten literal questions concerning each story immediately after reading it. Each child's reading and answers were tape recorded. Results of analysis of the oral reading errors, comprehension questions, and reading rate showed that, quantitatively, subjects made more errors on the grade-five story than on the grade-three story and HiC-LoWR subjects made more errors; and, qualitatively, HiC-LoWR subjects used contextual information to better advantage, making fewer errors that were not contextually appropriate. (JM)

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Investigating the Relationship between Comprehension and Word Recognition: Oral Reading Analysis of Children with Comprehension or Word Recognition Disabilities

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While some reading experts have assumed that word recognition and comprehension are highly related (e.g., Durrell, 1958), other investigators have argued that the relationship is less substantial (Wiener & Cromer, 1967). In two recent studies, implicit support has been offered for the latter position. Both Cromer (1970) and Guthrie (1973) have concluded that there may be two types of disabled readers, one primarily deficient in word recognition skills and the other primarily deficient in comprehension skills.

To examine types of disabled readers, Cromer selected good and poor college-level readers. The poor readers fit two of the models Wiener and Cromer (1967) described as accounting for reading disability: the deficit model, where there is an absence of some ability, and the difference model, where there is a mismatch between reader and material. Cromer's deficit readers had both poorer vocabulary and comprehension skills than the good readers, while difference readers had vocabulary skills similar to but comprehension skills poorer than the good readers. Textual material was presented to subjects under four conditions: regular sentences, meaningful phrases, fragmented phrases, and single words. Under the meaningful phrases condition, the difference group's

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comprehension was as good as that of the good readers. Such organization had no effect on the deficit group; their comprehension was poor under all conditions. Cromer concluded that the difference group's poor comprehension was due to their failure to make use of the meaningful relationships among words within sentences.

Guthrie compared the comprehension of good and poor readers on a silently read maze task (modified cloze). Three groups of subjects were selected: good young readers (mean age 7.4, matched with poor readers on word recognition and IQ), good old readers (mean age 10.1, matched with poor readers on age and IQ), and poor readers. Although the poor readers had similar word recognition skills to good young readers, their total comprehension was inferior to good old readers. Guthrie concluded that specific comprehension deficiencies existed and suggested two subpopulations of poor readers, those with poor grapheme-phoneme association skills and those with poor comprehension skills.

Certain problems with each study weaken their evidence. Cromer's findings may have resulted from chance errors of measurement which affected the selection of subjects. As Calfee noted, "The Deficit and Deficit-controls are poor and good readers, respectively. The Difference and Difference-controls are two groups of moderately poor readers, not different from one another (Note 1, p. 32)." Calfee suggested that replication of the findings was imperative. Guthrie's design did not provide the data for his conclusion. He had only one group of poor readers, matched with good young readers on the basis of word recognition knowledge, and showed that they had poor comprehension as well as poor word recognition skills. Thus he did not demonstrate that there were two types of poor readers but that poor readers appear to have at least two kinds of skill deficits.

To investigate further the existence of these two types of disabled readers, as well as to gain additional insights into the relationships between word recognition and comprehension, the oral reading behavior of two types of disabled readers was compared. Cromer demonstrated that readers with poor comprehension but adequate word recognition abilities fail to make use of the meaningful relationships among words; oral reading analysis may demonstrate that these readers pay more attention to the graphic than the contextual information in a passage. On the other hand, readers with good comprehension but poor word recognition abilities may make errors that more often are contextually than graphically constrained. Such insights would have important implications for differential remediation of types of disabled readers.

Method

Subjects

Ss were selected from 160 fifth-graders who attended four schools located in a medium-sized Midwestern city. Scores for all Ss were available for the Iowa Tests of Basic Skills (ITBS) Reading Comprehension Test (1971); the Standard Reading Inventory (SRI) (1966) isolated vocabulary word recognition lists; the Lorge Thorndike Intelligence Tests, Nonverbal subtest (LT-N) (1971); and the Peabody Picture Vocabulary Test (PPVT) (1959). ITBS scores are grade equivalent scores; SRI scores are grade level scores (e.g., 3-2 indicates third year, second semester).

Comprehension and word recognition deficiencies were defined in terms of relative scores. Ss' comprehension test scores were ranked; Ss whose scores were in the lower 25% of the total sample and whose word recognition scores were in the upper 75% were selected for the first group (LoC-HiWR, N=20). Ss' word recognition test scores were then ranked; those Ss whose scores were in the lower 25% of the total sample

and whose comprehension scores were in the upper 75% were selected for the second group (HiC-LoWR, N=19).

Seven subjects were lost from each group. Some had moved out of the district; others were lost due to difficulties encountered in tape recording the oral reading. Analyses revealed no significant differences between ITBS, SRI, LT-N, or PPVT scores of the original and remaining Ss. The LoC-HiWR group, then, consisted of 13 Ss (ITBS 1.5 to 3.0, SRI 3-2 to 5, LT-N 90.8, PPVT 89.6), and the HiC-LoWR group consisted of 12 Ss (ITBS 3.1 to 4.7, SRI 1-2 to 3-1, LT-N 88.6, PPVT 96.6). There were no significant differences between groups on the LT-N or PPVT.

Testing Procedure

The oral reading samples were obtained by a research assistant. Selections were two stories of high grade 3 and grade 5 readability according to Predicting Readability Levels (Botel, 1962), 233 and 283 words long, respectively. Neither story had been read or heard by any of the children. E noted the time taken to read each story and asked ten literal questions over each story immediately after it had been read. Each child's reading and answers to questions were audio-tape-recorded.

Scoring of Oral Reading Errors

The judges, three college graduates, were trained to use the oral reading analysis scoring procedure reported in Hood (1976). The 25 oral reading samples were divided into three groups of 8, 8, and 9 children. Each group was scored by each judge who categorized every error as to type and recorded its graphic similarity, its status as corrected or uncorrected, and its level of contextual appropriateness. The sequence of scoring was balanced among scorers so that each group was scored once in each position in the sequence. No judge was aware of the purpose of the study.

Scores derived from the coding of errors were: ERR - total number of errors; SIM - proportions of graphically similar errors; NCA - proportions of errors not contextually appropriate; PRE - proportions of errors contextually appropriate with the preceding but not the following context; SEN - proportions of errors appropriate to the sentence in which it occurred; PASS - proportions of errors appropriate in the passage; CORR - proportions of corrected errors.

Scores for each S were the mean value derived from the three scorers for each type of error. Cronbach's (1951) alpha reliability coefficient was determined for each of the error scores over the combined stories. Scores from the one grade 3 and one grade 5 stories used for training of scorers were not included in reliability estimates.

Scoring of Comprehension Questions

The research assistant scored the responses to the questions about the stories without knowledge of the group to which Ss belonged. Comprehension scores (COMP) were the number of questions answered correctly.

Reading Rate

Reading rates (RATE) were determined by timing each S's story from the tape recordings; rates are reported as number of words read per minute.

Results

Lindquist (1953) Type I analyses of variance were performed on the total number of errors, each type of reading error, and on comprehension and rate. Types of disabled reader was the between-subject factor, and story difficulty was the within-subject factor. Five of six reliability coefficients ranged from .70 to .98; only one was below that, 56.5.[1] Table 1 presents the data.

Quantitatively, there were more errors (ERR) on the grade 5 than the grade 3 story, $F(1,23) = 98.1$, $p<.05$. Qualitatively, four of the six

error-type scores were significant: NCA, $F(1,23) = 40.8$, $p<.05$; PRE, $F(1,23) = 33.1$, $p<.05$; SEN, $F(1,23) = 15.3$, $p<.05$; and CORR, $F(1,23) = 15.2$, $p<.05$. There were also significant comprehension and reading rate effects: COMP, $F(1,23) = 57.8$, $p<.05$, and RATE, $F(1,23) = 5.2$, $p<.05$.

Several significant differences between the two types of disabled readers were observed. Quantitatively, HiC-LoWR Ss made more errors: ERR, $F(1,23) = 11.1$, $p<.05$. Contrary to expectations, the qualitative analysis showed that HiC-LoWR Ss made more NCA errors, $F(1,23) = 7.6$, $p<.05$; PRE errors, $F(1,23) = 11.2$, $p<.05$; and corrected fewer errors (CORR), $F(1,23) = 12.2$, $p<.05$. Their reading rate (RATE) was also significantly slower, $F(1,23) = 21.3$, $p<.05$.

Hood (Note 2) has suggested that passage difficulty can interact with reader ability to produce differences in quantitative and qualitative oral reading error scores. In the present study, as reported above, there were significant variations in both quantitative and qualitative errors according to story difficulty. Examination of quantitative error scores revealed that HiC-LoWR and LoC-HiWR Ss made the same number of errors (ERR) on the easier and more difficult stories, respectively, suggesting that these two different passages were comparable in difficulty for the respective groups. Table 2 presents mean error scores, rates, and comprehension scores for the two S groups on the easier and more difficult stories.

Several interesting trends emerged when qualitative error scores from the passages of comparable difficulty were contrasted. The rankings of the two groups in use of contextual information were reversed, demonstrating, as expected, that HiC-LoWR Ss used contextual information to better advantage; they made fewer errors that were not contextually

appropriate and more errors appropriate at the sentence level. Again there was no difference in the use of graphic cues. HiC-LoWR Ss corrected about the same number of errors as LoC-HiWR Ss, but they were reading much more slowly.

Discussion

Preliminary examination of main effects suggested that LoC-HiWR Ss were reading in a manner similar to good comprehenders in general (see Golinkoff, 1976). When material was of comparable difficulty, as indicated by total error scores for the two groups (columns two and three of Table 2), HiC-LoWR Ss made fewer NCA errors, suggesting greater sensitivity to contextual information. These results support the contention that word recognition and comprehension are not necessarily highly related; apparently there is more involved in comprehending text than the ability to recognize individual words. The results further demonstrate the importance of equating the total number of errors readers make when comparing and evaluating their reading behavior. A qualitative analysis can be highly misleading if the quantitative analysis does not put it into perspective. This interpretation is substantiated by Osol and Leslie (Note3) who found that the quality of good readers' oral reading behavior deteriorated as the quantity of errors increased.

While at first glance it may appear that HiC-LoWR Ss did not actually demonstrate their sensitivity to contextual information since they correctly answered only as many comprehension questions as their LoC-HiWR counterparts, it must be remembered that they were making nearly twice as many errors while reading each story. When stories of comparable difficulty for the two S groups were compared, the HiC-LoWR Ss correctly answered substantially more questions than the LoC-HiWR Ss. Admittedly this comparison is confounded with story difficulty, but it does suggest

that the HiC-LoWR Ss should be comprehending better than they are but are unable to because of the effort expended on recognizing words. Because their comprehension is as good as it is, perhaps they have learned to use a "scan-for-meaning" strategy, a charecteristic found in other good comprehenders (Golinkoff, 1976, p. 646).

The effort required by HiC-LoWR Ss to maintain their comprehension with their poor word recognition abilities is substantiated in a post hoc analysis of reading rate. Comparison of performance by stories showed a significant difference in rate for the grade 3 story, $t(23) = 2.38$, $p<.05$, and a nearly significant difference for the more difficult story, $t(23) = 1.98$, $p<.06$. The high cost involved in maintaining comprehension while struggling through difficult material is reflected in these low rates as well as in the high ERR scores. Reading such difficult material will undoubtedly have a detrimental effect on these Ss' reading habits and skill development.

The finding that LoC-HiWR Ss did not use contextual information as well as they might when reading orally is similar to findings of Cromer. Cromer's difference group was defined in a similar manner to the LoC-HiWR Ss of the present study. He suggested that his accomplished readers had comprehension problems because they were unable to organize materials into meaningful units; when material was organized for them, their comprehension was as good as that of the normal group. Perhaps the children classified as LoC-HiWR Ss in the present study were also unable to take advantage of the meaningful relationships that exist within sentences and therefore paid less attention to the preceding context and to the contextual information in the sentence as a whole. Remediation using preorganized materials, as Cromer suggests, may improve the comprehension of such

students by encouraging them to read in terms of meaningful units. Further research is necessary to examine the validity of this suggestion.

The findings of the present study are also similar to those of Guthrie. Although he measured the use of contextual information differently, his Ss with poor comprehension but adequate word recognition used the available contextual information less well. These results suggest that there may well be, as Guthrie hypothesized, two types of disabled readers.

Reference Notes

1. Calfee, R. C.; Arnold, R.; & Drum, P. Review of The Psychology of Reading by E. J. Gibson & H. Levin. Unpublished manuscript, 1977.

2. Hood, J. The relationships of test passage characteristics to oral reading error scores. Paper presented at the meeting of the International Reading Association, Anaheim, May 1976.

3. Osol, P., & Leslie, L. Changes in oral reading strategies as a function of quantity of miscues. Paper to be presented at the meeting of the American Educational Research Association, New York, April 1977.

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Footnotes

1 This lower reliability coefficient may be due to the small proportion of SEN errors (Hood, 1976a). A low reliability coefficient would be of concern when the comparison of means is not significant; in the present study, mean differences are significant in spite of the low coefficient.

Table 1

Total Number of Errors, Mean Proportions of Errors, Comprehension Scores, and Reading Rates as a Function of Story Difficulty and Type of Disabled Reader

	Story Difficulty		Type of Disabled Reader		
Measures	Grade 3 Story	Grade 5 Story	LoC-HiWR (N=13)	HiC-LoWR (N=12)	Interscorer Reliabilities
ERR	11.5 *	19.5	11.5 *	19.8	98.6
SIM	60.8%	64.1%	60.8%	64.2%	95.9
NCA	48.4% *	70.2%	53.4% *	65.6%	92.9
PRE	29.3% *	16.7%	27.2% *	18.4%	72.0
SEN	13.6% *	6.6%	9.9%	10.3%	56.5
PASS	8.7%	6.6%	9.4%	5.5%	70.2
CORR	34.7% *	21.1%	35.9% *	19.2%	94.1
COMP	8.0 *	4.9	6.7	6.2	
RATE	71.8 *	64.0	80.3 *	54.5	

*$p < .05$

Table 2

Total Number of Errors, Mean Proportions of Errors, Comprehension Scores, and Reading Rates for Each Story as a Function of Type of Disabled Reader

	LoC-HiWR (N=13)		HiC-LoWR (N=12)	
Measures	Grade 3 Story	Grade 5 Story	Grade 3 Story	Grade 5 Story
ERR	7.9	14.8	15.5	24.3
SIM	58.5%	63.1%	63.2%	65.2%
NCA	44.0%	62.3%	52.7%	78.6%
PRE	34.6%	20.7%	24.4%	12.4%
SEN	11.7%	7.8%	15.3%	5.4%
PASS	9.7%	9.2%	7.6%	3.6%
CORR	44.3%	27.6%	24.4%	14.0%
COMP	7.9	5.5	8.0	4.3
RATE	86.0	74.5	56.3	52.7